



Volunteer Lake Assessment Program Individual Lake Reports

WINONA, LAKE, NEW HAMPTON, NH

MORPHOMETRIC DATA

| | | | | | | | | |
|-----------------------|-------|---------------------------|-----------|-----------------------------------|------|------|---------------|----------------------|
| Watershed Area (Ac.): | 3,328 | Max. Depth (m): | 14.6 | Flushing Rate (yr ⁻¹) | 2.1 | Year | Trophic class | KNOWN EXOTIC SPECIES |
| Surface Area (Ac.): | 154 | Mean Depth (m): | 5.2 | P Retention Coef: | 0.54 | 1987 | MESOTROPHIC | |
| Shore Length (m): | 5,000 | Volume (m ³): | 3,161,000 | Elevation (ft): | 540 | 2005 | MESOTROPHIC | |

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

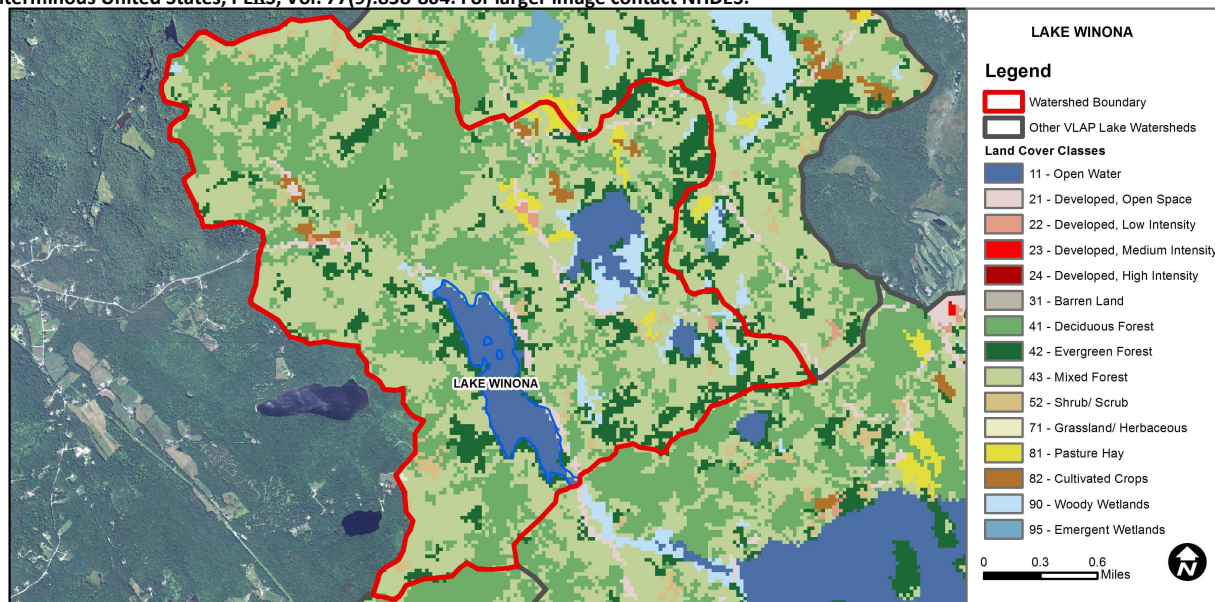
| Designated Use | Parameter | Category | Comments |
|----------------------------|--------------------|--------------|---|
| Aquatic Life | Phosphorus (Total) | Good | >/=5 samples and median is < threshold but > 1/2 threshold value. |
| | pH | Slightly Bad | >10% of samples exceed criteria by a small margin (minimum of 2 exceedances). |
| | D.O. (mg/L) | Bad | >10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin. |
| | D.O. (% sat) | Slightly Bad | >10% of samples exceed criteria by a small margin (minimum of 2 exceedances). |
| | Chlorophyll-a | Good | >/=5 samples and median is < threshold but > 1/2 threshold value. |
| Primary Contact Recreation | E. coli | Good | Geometric means < criteria; however at least 1 exceedance of the single sample criteria occurred. |
| | Chlorophyll-a | Very Good | At least 10 samples with 0 exceedances of criteria. |

BEACH PRIMARY CONTACT ASSESSMENT STATUS

| | | | |
|----------------------------|---------|-----------|---|
| LAKE WAUKEWAN - TOWN BEACH | E. coli | Very Good | All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria. |
|----------------------------|---------|-----------|---|

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



| Land Cover Category | % Cover | Land Cover Category | % Cover | Land Cover Category | % Cover |
|----------------------------|---------|---------------------|---------|----------------------|---------|
| Open Water | 7.09 | Barren Land | 0 | Grassland/Herbaceous | 0.04 |
| Developed-Open Space | 1.83 | Deciduous Forest | 30.07 | Pasture Hay | 1.16 |
| Developed-Low Intensity | 0.27 | Evergreen Forest | 10.89 | Cultivated Crops | 0.79 |
| Developed-Medium Intensity | 0 | Mixed Forest | 43.84 | Woody Wetlands | 2.3 |
| Developed-High Intensity | 0 | Shrub-Scrub | 1.58 | Emergent Wetlands | 0 |



VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

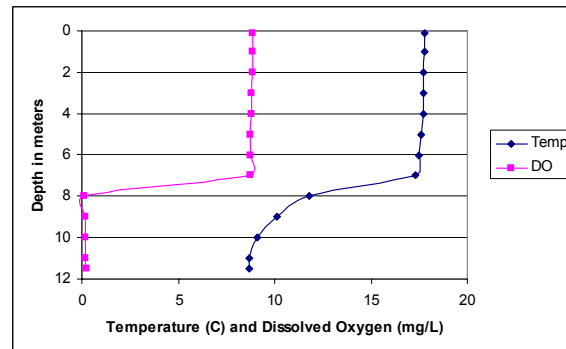
WINONA LAKE, NEW HAMPTON, NH

2012 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (Refer to Table 1 and Historical Deep Spot Data Graphic)

- ♣ **CHLOROPHYLL-A:** Chlorophyll levels spiked in July potentially indicating an algal bloom had occurred however decreased back to normal by September. Average chlorophyll increased from 2011 and was slightly greater than the NH lake median. Historical trend analysis indicates chlorophyll levels tend to fluctuate annually.
- ♣ **CONDUCTIVITY/CHLORIDE:** Conductivity and chloride were slightly greater than the NH lake median values. The highest levels were measured in Hawkins Pond Inlet which receives runoff from Winona Road.
- ♣ **E. COLI:** E. coli levels were low at all stations and well below state standards for public beaches and surface waters.
- ♣ **TOTAL PHOSPHORUS:** Epilimnetic (upper water layer) and metalimnetic (middle water layer) phosphorus levels were low throughout the summer and below the NH lake median. Historical trend analysis indicates epilimnetic phosphorus tends to fluctuate annually, however in recent years has been relatively stable. Hypolimnetic (lower water layer) phosphorus was elevated in June likely due to bottom sediment disruption while sampling. Hawkins Pond Inlet phosphorus was slightly elevated in September following a significant rain event.
- ♣ **TRANSPARENCY:** Transparency was lower in September due to wind and wave action, however average transparency was greater than the NH lake median. Historical trend analysis indicates a relatively stable transparency since monitoring began.
- ♣ **TURBIDITY:** Hypolimnetic turbidity was elevated in September likely due to an accumulation of organic compounds under conditions of oxygen depletion. Outlet turbidity was slightly elevated throughout the summer potentially due to low flow conditions.
- ♣ **pH:** pH tends to decrease to undesirable levels in the hypolimnion.
- ♣ **RECOMMENDED ACTIONS:** A sediment plume is clearly visible in Hawkins Pond Inlet and phosphorus and turbidity were slightly elevated following a rain event in September. Conduct storm event and bracket sampling of the tributary to identify sources of sediment and erosion. Keep up the great work!

Dissolved Oxygen & Temperature Profile



NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m³

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

| Station Name | Table 1. 2012 Average Water Quality Data for WINONA LAKE | | | | | | | | | |
|---------------------|--|---------|----------|-------|---------|---------|--------|------|-------|------|
| | Alk. | Chlor-a | Chloride | Cond. | E. Coli | Total P | Trans. | | Turb. | pH |
| | mg/l | ug/l | mg/l | uS/cm | #/100ml | ug/l | m | | ntu | |
| | | | | | | | NVS | VS | | |
| Deep Epilimnion | 6.73 | 5.27 | 8 | 58.9 | | 6 | 5.19 | 5.72 | 0.58 | 6.97 |
| Deep Metalimnion | | | | 55.9 | | 8 | | | 0.80 | 6.92 |
| Deep Hypolimnion | | | | 61.3 | | 20 | | | 5.72 | 6.35 |
| Hawkins Pond Inlet | | | 13 | 70.2 | 16 | 13 | | | 0.86 | 6.97 |
| Heights Brook Inlet | | | | 57.4 | 1 | 5 | | | 0.67 | 6.77 |
| North Inlet | | | 8 | 59.6 | 11 | 7 | | | 0.80 | 6.93 |
| Outlet | | | 7 | 61.2 | 6 | 9 | | | 2.36 | 6.76 |
| York Brook | | | 3 | 27.7 | 20 | 3 | | | 0.32 | 6.43 |

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: < 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

| Parameter | Trend | Explanation |
|-------------------------|----------|--|
| Chlorophyll-a | Variable | Data fluctuate annually, but are not significantly increasing or decreasing. |
| Transparency | Stable | Data not significantly increasing or decreasing. |
| Phosphorus (epilimnion) | Variable | Data fluctuate annually, but are not significantly increasing or decreasing. |

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Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data

